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CERTIFICATE OF MAILING 37 C.F.R. 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231 on the date indicated below.

Name of Person Signing Certificate: Rochelle M. Pleasant

12.20.2002 Rochelle M Pleasant

Date Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:		**Confirmation No.:**	**7506**
	SOMPONG PAUL OLARIG PAMELA M. COOK		
Filed:	December 31, 2001	Art Unit:	2166
Serial No.:	10/039,010	Examiner:	
For:	SUPPORTING INTERLEAVED READ/WRITE OPERATIONS FROM/TO MULTIPLE TARGET DEVICES	Docket No.:	H052617.1129US0

REQUEST FOR RECONSIDERATION OF PETITION
UNDER 37 CFR 1.47(a)

Attn: Office of Petitions
Commissioner of Patents
Washington, D.C. 20231

Dear Commissioner:

On October 25, 2002, the Office of Petitions issued a decision refusing status under 37 C.F.R. 1.47(a) in response to Applicant's Petition filed on September 9, 2002. As requested by the Office of Petitions, Applicants believe they has fully complied with the requirements under 37 C.F.R. 1.47(a) for a grantable petition. In support of this, Applicants enclose the following documents:

1. Letter to Ms. Pamela Cook dated November 21, 2002, enclosing:

   a. Patent Application as filed on December 31, 2002;
   b. Declaration; and
   c. Assignment;

2. Certified Mail Receipt postmarked by the United States Post Office on November 21, 1002; and

3. Declaration of Rochelle M. Pleasant dated December 26, 2002.

REMARKS

Applicants sent a letter to inventor Pamela M. Cook via certified mail, return receipt requested, and a copy via first class mail on November 21, 2002 (*see* **Exhibit 1**). The envelope was returned to the undersigned with a yellow sticker indicating "Return to Sender, No Forward Order on File, Unable to Forward" on November 25, 2002 (*see* copy of envelope as **Exhibit 2**). Prior to filing this Request for Reconsideration, Ms. Rochelle M. Pleasant, Prosecution Paralegal of the law firm of Akin Gump Strauss Hauer & Feld, LLP (law firm retained by the Assignee of record) attempted to contact Ms. Cook at her last known telephone number (281) 251-9330 to discuss this matter, but the telephone number was disconnected (*see* **Exhibit 3**, ¶ 4). As of this date, and after several database searches (attached to Exhibit 3), the undersigned has been unable to locate Ms. Cook.

Statement of Last Known Address

The last known address for Ms. Cook is:

Residence Address:	Pamela M. Cook 17130 Kirkchapel Drive Spring, Texas 77379
Work Address:	Pamela M. Cook Unknown

CONCLUSION

Applicant has made every effort required by 37 C.F.R. 1.47(a) to locate and obtain the signature of the non-signing inventor, Ms. Pamela M. Cook, to no avail. Therefore, Applicant respectfully requests that the Office of Petitions grant Applicant's petition filed on September 9, 2002, and allow this case to proceed.

If any additional fees are required for entry of this Petition, the Commissioner is hereby authorized to charge our Deposit Account No. 16-2435. A duplicate copy of this document is

enclosed for your convenience. If the Examiner has any questions, he is requested to contact David R. Clonts or the undersigned at (713) 220-5800.

Respectfully submitted,

John A. Tang, Reg. No. 43,404
ATTORNEY OF RECORD

Date: 12-26-02

AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.
711 Louisiana, Suite 1900
Houston, Texas 77002
Telephone: (713) 220-5800
Facsimile: (713) 236-0822

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1. Article Addressed to:

MS. PAMELA M. COOK
17130 KIRKCHAPEL DR.
SPRING, TX 77379

RMP 052617.1129

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City, State, ZIP+4 SPRING TX 77379

Fr: RMPearsons

PS Form 3800, May 2000 See Reverse for Instructions

AKIN GUMP
STRAUSS HAUER & FELD LLP
Attorneys at Law

ROCHELLE M. PLEASANT, CLA
713.250.2133/fax: 713.220.2304
rpleasant@akingump.com

November 21, 2002

Pamela M. Cook
17130 Kirkchapel Drive
Spring, Texas 77379

Via Certified Mail, RRR #7000 1670 0003 8301 5010 and First Class mail

Re: U.S. Patent Application Serial No. 10/039,010
Entitled: Supporting Interleaved Read/Write Operations From/To Multiple Target Devices
Inventors: Sompong P. Olarig and Pamela M. Cook
Our ref: 052617.1129
Compaq No.: P98-2406 (ISSG-SPD)
Applicant: Compaq – Houston

Dear Pamela:

Enclosed please find the following documents:

1. Patent Application as filed on December 31, 2001;
2. Declaration; and
3. Assignment.

Please execute the enclosed Declaration and Assignment concurrently, with the Assignment preferably being executed last *in front of a Notary Public,* and return to our office in the enclosed self-addressed, stamped envelope.

If you refuse to sign the enclosed documents, please indicate so below and return this letter to us in the enclosed self-addressed, stamped envelope. Your cooperation is appreciated.

Sincerely,

Rochelle M Pleasant

Rochelle M. Pleasant, CLA
Prosecution Paralegal

/enclosures

cc: Susan Scott, M110701
David R. Clonts (of the Firm)
Richard A. Schafer (of the Firm)

Re: U.S. Patent Application Serial No. 10/039,010
Entitled: Supporting Interleaved Read/Write Operations From/To Multiple Target Devices
Inventors: Sompong P. Olarig and Pamela M. Cook
Our ref: 052617.1129
Compaq No.: P98-2406 (ISSG-SPD)
Applicant: Compaq – Houston

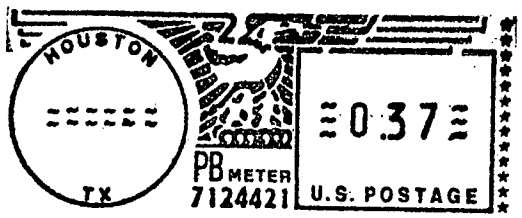
Date:_____

"I, Pamela M. Cook, joint inventor of U.S. Application Serial No. 10/039,010, refuse to sign the enclosed Declaration and Assignment."

_____

Pamela M. Cook
17130 Kirkchapel Drive
Spring, Texas 77379

AKIN GUMP
STRAUSS HAUER & FELD LLP
Attorneys at Law



ROCHELLE M. PLEASANT, CLA
AKIN GUMP STRAUSS HAUER & FELD LLP
711 LOUISIANA 19TH FLOOR - SOUTH TOWER
HOUSTON TX 77002

Attorney Docket No. H052617.1129US0

JOINT INVENTOR
ORIGINAL

DECLARATION

As a below named inventor, I hereby declare that: my residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first, and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SUPPORTING INTERLEAVED READ/WRITE OPERATIONS FROM/TO MULTIPLE TARGET DEVICES

as described in the specification [ ] attached or [X] of patent Application Serial No. 10/039,010, filed December 31, 2001 and amended on _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above; that I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application; that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months prior to this application; and that I acknowledge the duty to disclose information of which I am aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations § 1.56(a). Such information is material when it is not cumulative to information already of record or being made of record in the application, and

(1) it establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
(2) it refutes, or is inconsistent with, a position the applicant has taken or may take in:
  (i) opposing an argument of unpatentability relied on by the Office, or
  (ii) asserting an argument of patentability.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 of any foreign application(s) for patent or inventor's certificates listed below and have also identified below any foreign application(s) having a filing date before that of the application(s) on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE OF FILING	PRIORITY CLAIMED UNDER 35 USC 119
			YES NO
			YES NO

I hereby claim the benefit under Title 35 United States Code § 120 of any United States application(s) listed below and, insofar as any subject matter of any claim of this application is not disclosed in the prior United States Application, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application: _____.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
SOMPONG PAUL OLARIG		
RESIDENCE		CITIZENSHIP
Pleasanton, California		Thailand
MAILING ADDRESS		
3050 Paseo Granada, Pleasanton, California 94566		
FULL NAME OF JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
PAMELA M. COOK		
RESIDENCE		CITIZENSHIP
Spring, Texas		U.S.A.
MAILING ADDRESS		
17130 Kirkchapel Drive, Spring, Texas 77379		

ASSIGNMENT

WHEREAS, we, SOMPONG PAUL OLARIG and PAMELA M. COOK, are joint inventors of SUPPORTING INTERLEAVED READ/WRITE OPERATIONS FROM/TO MULTIPLE TARGET DEVICES application for United States Letters Patent application Serial No. 10/039,010, filed December 31, 2001; and

WHEREAS, COMPAQ INFORMATION TECHNOLOGIES GROUP, L.P. ("CITG"), a corporation created and existing under and by virtue of the laws of the State of Delaware, is desirous of acquiring the entire right, title and interest in and to the aforesaid invention throughout the world, and all right, title and interest in, to and under any and all Letters Patent of the United States and all other countries throughout the world;

NOW, THEREFORE, for and in consideration of the sum of One Dollar ($1.00) to us in hand paid by CITG and for other good and valuable considerations, the receipt of which is hereby acknowledged, we hereby sell, assign, transfer and set over to CITG, all right, title and interest in and to the said invention throughout the world, and said application for U.S. Letters Patent, and any and all divisions, continuations, reexaminations and reissues thereof, and any and all Letters Patent of the United States and foreign countries which may be granted therefor, the same to be held and enjoyed by CITG for its own use and benefit, and for the use and benefit of its successors, assigns, or other legal representatives, to the end of the term or terms for which said Letters Patent of the United States or foreign countries are or may be granted, reexamined or reissued, as fully and entirely as the same would have been held and enjoyed by us if this assignment and sale had not been made.

And we hereby authorize and request the Commissioner of Patents and Trademarks to issue any and all Letters Patent of the United States on said invention or resulting from said application and from any and all divisions, continuations, and reissues thereof, to CITG, as assignee of our entire interest, and hereby covenant that we have the full right to convey the entire interest herein assigned, and that we have not executed and will not execute any agreement in conflict herewith.

And we further hereby covenant and agree that we will, at any time, upon request, execute and deliver any and all papers that may be necessary or desirable to perfect the title of said invention and to such Letters Patent as may be granted therefor, to CITG, its successors, assigns, or other legal representatives and that if CITG, its successors, assigns or other legal representatives shall desire to file any divisional or continuation applications or to secure a reexamination or reissue of such Letters Patent, or to file a disclaimer relating thereto, will upon request, sign all papers, make all rightful oaths and do all lawful acts requisite for the filing of such divisional or continuation application, or such application for reissue and the procuring thereof, and for the filing of such disclaimer, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

And we do further covenant and agree that we will, at any time upon request, communicate to CITG, its successors, assigns or other legal representatives, such facts relating to said invention and Letters Patent or the file history thereof as may be known to us, and testify as to the same in any interference or other litigation when requested so to do, without

further compensation but at the expense of said assignee, its successors, or other legal representatives.

EXECUTED THIS ____ day of _____, 2002.

_____
SOMPONG PAUL OLARIG

STATE OF CALIFORNIA §
§
COUNTY OF _____ §

BEFORE ME, the undersigned authority, on this day personally appeared SOMPONG PAUL OLARIG, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND and seal of office this ____ day of _____, 2002.

_____
NOTARY PUBLIC IN AND FOR THE
STATE OF CALIFORNIA

* * * * * * * * * * *

EXECUTED THIS ____ day of _____, 2002.

_____
PAMELA M. COOK

STATE OF TEXAS §
§
COUNTY OF HARRIS §

BEFORE ME, the undersigned authority, on this day personally appeared PAMELA M. COOK, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND and seal of office this ____ day of _____, 2002.

_____
NOTARY PUBLIC IN AND FOR THE
STATE OF TEXAS

APPLICATION FOR PATENT

TITLE: SUPPORTING INTERLEAVED READ/WRITE OPERATIONS FROM/TO MULTIPLE TARGET DEVICES

INVENTORS: SOMPONG PAUL OLARIG and PAMELA M. COOK

SPECIFICATION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not applicable.

STATEMENTS REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

REFERENCE TO A MICROFICHE APPENDIX

[0003] Not applicable.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0004] The present invention generally relates to read/write transactions on a computer bus and more particularly, but not by way of limitation, to a method and apparatus for supporting interleaved read/write operations for multiple target devices in a multicast computer environment.

2. Description of the Related Art

[0005] A conventional computer system typically includes one or more Central Processing Units (CPUs) capable of executing algorithms forming applications in a computer main memory. Peripheral devices, both those embedded together with a CPU or constructed to be separate therefrom, also typically form portions of a conventional computer system. Computer peripheral devices include, for instance, video graphics adapters, Local Area Network (LAN) interfaces, Small Computer System Interface (SCSI) bus adapters, and mass storage devices, such as disk drive assemblies.

[0006] A computer system further typically includes computer buses which permit communication of data between various portions of the computer system. For example, a host bus, a memory bus, at least one high-speed bus, a local peripheral expansion bus, and one or more additional peripheral buses form portions of a typical computer system.

[0007] A peripheral bus is formed, for instance, of an SCSI bus, an Extension to Industry Standard Architecture (EISA) bus, an Industry Standard Architecture (ISA) bus, or a Peripheral Component Interface (PCI) bus. The peripheral bus forms a communication path to and from a peripheral device connected thereto. The computer system CPU, or a plurality of CPUs in a multi-processor system, communicates with a computer peripheral device by way of a computer bus, such as one or more of the computer buses noted above.

[0008] A computer peripheral, depending upon its data transfer speed requirements, is connected to an appropriate peripheral bus, typically by way of a bus bridge that detects required actions, arbitrates, and translates both data and addresses between the various buses.

[0009] Software drivers are typically required for each computer peripheral device to effectuate its operation. A software driver must be specifically tailored to operate in conjunction with the particular operating system operating on the computer. A multiplicity of software drivers might have to be created for a single computer peripheral to ensure that a computer peripheral device is operable together with any of the different operating systems.

[0010] The complexity resulting from such a requirement has led, at least in part, to the development of an Intelligent Input/Output (I_2O) standard specification. The I_2O standard specification sets forth, *inter alia*, standards for an I/O device driver architecture that is independent of both the specific peripheral device being controlled and the operating system of the computer system to which the device driver is to be installed.

[0011] Regardless of which bus protocol is deployed in a computer system or whether the computer system is I_2O compliant, devices frequently employ bus master/slave functionality to communicate across a computer system bus. In a typical bus transaction, a single bus master sends information, including, but not limited to, address, data and control information to a single target device operating as a slave during a single bus transaction. In certain situations, however, it is desirable to broadcast the information to multiple targets. For example, in a fault-tolerant

environment it is desirable to perform fast backup of data such as by providing mirrored disk drives. Conventional methods for sending information to multiple targets requires moving the information multiple times using multiple bus transactions. Specifically, with respect to I_2O compliant systems, this process is particularly inefficient due to well known I_2O compliant communication protocol causing significantly longer latencies.

[0012] Commonly assigned U.S. Patent No. 6,230,225 proposes a technique which would effectuate low-latency distribution of data to multiple target devices. It further proposes a technique for multicasting on a computer system bus wherein information from a single bus master is broadcast to multiple targets during a single bus transaction.

[0013] Other advances have been made to improve efficiencies for execution of memory bus operations, for example disk striping and partitioned memory. Disk striping is a technique for spreading data over multiple disk drives. The computer system breaks a body of data into units and spreads these units across the available disks. A different approach has been to provide partitioned memory where the data in memory is divided into multiple sections. Partitioned memory results in an entire physical address spacing divided into groups of fixed sizes. Each of partitioned memory is independent from each other such that each partitioned segment is accessed one at a time. Alternatively, the data contained in memory has been arranged in particular ways, such as in a non-contiguous manner, to increase performance. Interleaved memory is a means of accessing memory where the requesting device can access, for example, alternate memory sections or separate data segments immediately, without waiting for memory to catch up (for example, through wait states). Within a partitioned memory, memory devices can be interleaved to improve the memory performance. The processor can access alternate sections immediately. Interleaved memory is one approach for compensating for the relatively slow speed of dynamic RAM (DRAM). Other techniques included page-mode memory and memory caches.

SUMMARY OF THE INVENTION

[0014] The computer system provides improved performance for data operations, particularly optimized for RAID storage. An initiator device initiates an interleaved data read or write operation as a single request to multiple target devices. The target devices are grouped together during system configuration to collectively recognize a shared base address from the data read

or write command. Further, each target device of the collective target group is assigned during system configuration a particular portion of data storage against which data operations are executed. The collective group of target devices then responds to the single issued data operation in a manner where each target device of the collective target group simultaneously executes the data request only to the specific data location assigned to the target device. Wait states or the response times are reduced by reducing the number of requests required to address multiple targets. Likewise, interleaved data requests increase system efficiency by allowing the multiple targets to simultaneously access different portions of memory in response to the issued request.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0015] A better understanding of the present invention can be obtained when the following detailed description of the preferred embodiment is considered in conjunction with the following drawings, in which:

Figure 1 is a functional block diagram of an apparatus for effectuating multicasting on a computer system bus;

Figures 2A and 2B are timing diagrams for effectuating multicasting on a computer system bus consistent with the apparatus described in Figure 1;

Figure 3A is a flow diagram for configuring target devices consistent with the apparatus of Figure 1;

Figures 3B and 3C are memory maps illustrating target configuration for interleaved memory portions;

Figure 4 is a flow diagram for effectuating multicasting on a computer system bus for interleaved READ operations from memory; and

Figure 5 is a flow diagram for effectuation multicasting on a computer system bus for interleaved WRITE operations to memory.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0016] The following patent and applications are incorporated herein in their entirety by reference:

U.S. Patent Application entitled "Method and Apparatus for Eliminating the Software Generated Door Bell," by Sompong P. Olarig and Thomas J. Bonola, filed concurrently herewith;

U.S. Patent Application Serial No. 09/735,267 entitled "Different Buses in a Computer System," by Sompong P. Olarig, Thomas J. Bonola and Ramakrishna Anne, filed December 12, 2000; and

United States Patent Number U.S. 6,230,225 B1, entitled "Method and Apparatus for Multicasting on a Bus," by Sompong P. Olarig and Thomas J. Bonola, granted May 8, 2001.

[0017] The illustrative system described in this patent application provides a technique for improved system efficiency for data read and write operations in a system containing multiple target devices. For purposes of explanation, specific embodiments are set forth to provide a thorough understanding of the illustrative system. However, it would be understood by one skilled in the art, from reading the disclosure, that the technique may be practiced without these details. The use of the terms PCI, PCI target device and SCSI and SCSI controllers to illustrate how the system works is not intended to infer that the illustrative system requires a specific type of communication architecture or specific type of memory architecture. Rather, any of a variety of memory architectures and communication platforms may be employed in practicing the technique described herein. Moreover, well known elements, devices, process steps, and the like, are not set forth in detail in order to avoid obscuring the disclosed system.

[0018] Referring now to Figure 1, there is illustrated a functional block diagram of an apparatus, shown generally at 100, for effectuating multicasting operations for interleaved data storage on a computer system bus. A plurality of host CPUs 110, a host memory 120, a host-to-PCI bridge 130 and other devices (not shown) typically associated with a host computer system communicate with one another across a host bus 140. The host to PCI bridge 130 and a plurality of PCI devices 150A-N communicate with one another across a PCI bus 160. The PCI devices 150A-N can be located on a mother board together with the host CPUs 110 or can be located off of the mother board separate from the host CPUs 110. Communications between devices on the host bus 140 and devices on the PCI bus 160 is effectuated via the host to PCI bridge 130 in a manner well known in the industry. Furthermore, as will be described in greater detail, information is broadcast from devices on the host bus 140, for example the host CPU 110, to multiple PCI devices 150A-N across the PCI bus 160 via the host to PCI bridge 130 in conjunction with a multicast bus 165, discussed in greater detail with reference to United States Patent No. 6,230,225 B1, incorporated above.

[0019] The host-to-PCI bridge 130 is controlled by a controller 170 and includes a memory 180 which among other things, contains a plurality of configuration registers 190 utilized, for example, to contain system initialization parameters, such as memory assignments discussed below, and communication protocol parameters, such base address settings also discussed below.

[0020] Each PCI device 150A-N includes a PCI bus interface 167A-N and a multicast bus interface 169A-N for interfacing to the PCI bus 160 and the multicast bus 165 respectively. Each PCI device 150A-N is controlled by an associated controller 200A-N and includes an associated memory 210A-N. Command information and target identification information communicated across the multicast bus 165 to the PCI devices 150A-N is decoded by the PCI devices 150A-N using an associated decoder 220A-N. Each PCI device 150A – 150N is further coupled to one or more data storage devices 230A – 234A, 230B – 234B, 230C – 234C and 230N – 234N. Data operations from the CPU 110 for data to be read from or written to the data storage devices is performed through the PCI devices 150A – 150N. The data storage devices are configured as memory apportioned among the PCI devices such that multiple PCI devices may simultaneously respond to interleaved data operations (discussed in more detail in connection with the figures below).

[0021] The multicast operation to multiple targets from a single initiator achieves savings by reducing the number of requests needed to address the targets. In addition, according to the disclosed subject matter, providing a single read from multiple targets improves performance by avoiding wait states and limits inefficiencies shifting data transfer operations from the executing device to the data bus. According to an embodiment, a SCSI application is one example. In a typical SCSI application, an initiating device issues a request to a SCSI controller via a PCI bus. The SCSI controller then initiates the proper SCSI bus phases to pass the request to the targeted device.

[0022] Typical SCSI disk drives only provide about 10 Mbytes per second throughput. A SCSI ULTRA-2 bus has a maximum throughput of 80 Mbytes per second and SCSI ULTRA-3 has a maximum of 160 MBps. A PCI bus running at 66 MHz/64 bits (528 MBps) can easily maintain activity on more than six SCSI buses. However, with disk drives, a significant amount of time is spent waiting for the physical device to respond to the request. Since the throughput of the SCSI bus (80MBps) is so much higher that a SCSI (10MBps) device, the present disclosure maximizes disk performance by increasing data transfer between the controller and

the devices on the SCSI bus. This way more data is consistently ready to be placed on the PCI bus rather than waiting for individual requests of a particular SCSI device. Although, the transfer time for the SCSI disk drives may increase in certain situations, this latency will not overcome the savings due to the electrical speed of the SCSI bus.

[0023] Even applying present disk partitioning or striping technology, where a larger request to segmented memory is satisfied by multiple controllers, the throughput of the SCSI bus is still a limiting factor. According to the disclosed subject matter, a single application sends/receives data to and from several controllers. As such, the disk input/output transfer throughput increases for each additional controller.

[0024] Although a PCI environment is discussed as an exemplary embodiment of the disclosed subject matter, it should be understood that other bus protocols can be implemented according to known techniques without departing from the spirit of the invention. For example, although typically compatible with PCI in the first instance, a disk array system utilizing SCSI protocol can be implemented replacing the PCI bus and PCI devices with a SCSI bus and disk array controllers. Another embodiment includes communication to SCSI compatible controllers over the PCI bus itself. Furthermore, alternatives to a PCI environment includes other I/O bus architecture such as PCI-X, Infiniband, Fibre Channel and other networking interconnects such as GigaBit Ethernet. The method and apparatus disclosed herein is not dependent on a specific platform and other communication protocols and memory architectures may also benefit from the disclosed subject matter.

[0025] Turning to Figure 2, shown are exemplary read requests utilizing multiple target devices comparing the savings in cycles of a multicast, interleaved read operation according to the disclosed subject matter, illustrated in Figure 2B, and a read operation according to typical sequential addressing protocol, illustrated in Figure 2A. In Figure 2A, an initiator device issues a read request to be executed by multiple target devices. Each target device requires independent addressing, such that multiple reads are required by the initiator. This consumes valuable initiator device resources, when the initiator could be performing other tasks. Each target, in turn, must wait until that target device sees its address issued onto the bus. Once a target has been addressed, that target is then free to execute the read request to return the requested data. However, because multiple read requests are required, the target devices must respond in a sequential manner limited by the speed the initiator can issue the multiple requests and the

availability of the bus to transmit the multiple sequential requests. In this way, bus resources are required to provide the transmission of the multiple requests. Finally, the time to return the data is extended due to the wait time seen by each subsequent target device.

[0026] In Figure 2B, an initiator issues a single request which is seen by all of the targets of the collective target grouping as a request to each target to respond to the read. Specifically, each of the targets of the grouping is configured to recognize a single base address to address the collective target group. Because each target has been addressed with the single request, each target is able to simultaneously execute the request and return the data, subject to bus arbitration. Resources of both the initiator device and the bus is saved due to the single request and the overall return cycle time is reduced as wait states to the target devices are minimized.

[0027] Turning now to Figure 3A, shown is a configuration protocol according to an embodiment of the disclosed subject matter. Configuration begins at step 300 where initialization of the system and specifically the PCI devices 150A-150N occurs. Although configuration may occur at anytime, including during communication processing, typically configuration is performed during power-up or before or during a plug and play sequence. According to an embodiment of the disclosed subject matter, configuration is performed by the BIOS or by the plug and play system software.

[0028] At step 304, target groups are collectively configured with a single base address. This allows a grouping of targets to recognize an initiator request with a single base address as a request to all of the target devices 150 included in the target group. A target device group may consist of any variation of device types or of number of devices. A consideration for target group configuration may include, for example, optimization of the amount or location of memory typically accessed by the system. For example, where it is known that certain portions of memory are more routinely accessed than others, a target group may be configured as dedicated to that portion of memory. Other target groupings may be more general in nature. Other considerations may be important in configuring a target grouping including the size of the logical memory blocks, the striping factor or the granularity of blocks among RAID devices, and the number of disks being utilized.

[0029] The process continues at step 305 where the system loops between 304 and 305 to configure all additional target groupings. The configuration process is performed according to

known configuration protocols. The Extended System Configuration Data (ESCD) format, for example, is an industry standard for storage of both plug and play and non-plug and play device configuration. The ESCD format is used to store detailed configuration information in the NVRAM for each device to be configured. Configuration is performed for all devices coupled to the system at the first initialization. Peripheral devices subsequently added to the system are configured upon connection. Thus a running configuration is maintained so the configuration software tracks when further configuration is required.

[0030] Once all the target groups have been collectively configured to recognize a single base address request at step 306, the individual target devices 230A-230N, 232A-232N and 234A-234N are assigned portions of partitioned memory, discussed in more detail with reference to Figure 5. According to one embodiment, step 306 includes associating a certain portion of memory with each target device of the collective target group. Once the target groups have been configured and the individual targets within the target groupings have been assigned portions of interleaved memory, configuration is complete and the system is ready to respond both to broadcast read operations 400 or broadcast write operations 500.

[0031] Turning now to Figures 3B and 3C, shown are exemplary configurations for interleaved memory. Specifically, portions of memory are preassigned during system configuration, or alternatively between cycles during normal system operation, to a specific target device. Furthermore, the assignment of memory portions are divided in any number of ways among the target devices in a particular target grouping. For example, in a target grouping of two target input/output controllers, 320 and 322 for example, one target device 320 might be assigned to respond to requests to even bytes or blocks of data in memory while the other target device 322 would be configured to respond to requests to odd bytes or blocks of memory. This interleaving of memory may be split among the collective target groups in any number of ways. For example, according to another embodiment, the target devices 324-330 of a collective target device grouping may be configured to respond to requests to every N bytes or blocks. The assignment of interleaved memory to specific target devices creates smaller blocks of memory for each data transaction allowing a target to access portions of requested data, for example in response to a read request, as part of a larger data request. The other target devices of the collective target device group access the remaining requested data simultaneously. Because, smaller portions are retrieved wait states are reduced or avoided. Specifically, because interleaved data operations can be performed concurrently with one another, or more particularly,

one data request can be executed in simultaneous smaller portions, large amounts of data may be retrieved without waiting for memory to catch up with on larger request or multiple smaller sequential requests. Likewise, because multiple targets are retrieving data concurrently, the efficiencies due to reducing or avoiding wait states is realized and passed as an improvement to average storage access time and the overall data operation.

[0032] Turning now to Figure 4, shown is a process for implementing a READ operation 400 according to an embodiment of the disclosed subject matter. Specifically at step 408, an initiating device issues a single READ command, for example, to request data from memory. At step 410, one or more of the collective target groups recognizes the base address within the READ request. Essentially, each target group listens to the entire request (at the same time) and only processes its own portion, as previously configured of the request. Thus, for example, target 1, target 2, to target N have been initially configured as part of a collective target group. Each of the targets within this particular target group processes only the part of the READ request for data stored within the portion of memory the specific target device had been previously assigned during configuration.

[0033] At step 412, target 1 executes the READ request by requesting data from memory within the portion of memory previously assigned to target 1. Similarly, target 2 executes the read request to its assigned portion of memory. This continues until at step 424 all of the targets of the addressed target group have executed the read request to their assigned portions of memory at step 424.

[0034] This interleaved memory read approach allows each of the targets to respond to requests for smaller data and do so simultaneously. Thus, steps 412, 416, up to 424 occur concurrently for all targets configured within the target group. At steps 414, 420, and 426, each of the target controllers receives the requested data. At steps 416, 422, and 428, each target writes to the multicast bus a signal indicating data is ready for transmission. Target writes to the multicast bus is more fully discussed in U.S. Patent Application entitled "Method and Apparatus for Eliminating the Software Generated Door Bell," U.S. Patent Application Serial No. 09/735,267 and United States Patent Number U.S. 6,230,225 B1, above incorporated by reference.

[0035] In conventional systems, a read to multiple target devices required issue of multiple sequential reads requests to each target device being communicated. The disclosed multicast system allows for multiple controllers to respond to smaller portions of a read request and interleaved memory allows the multiple controllers to respond simultaneously.

[0036] Continuing at step 430, after each target device concludes execution of its portion of the read request, the host issues a second broadcast READ over the PCI bus 160. At step 432, the collective target group recognizes the base address of this second broadcast READ. Target 1 responds to the second broadcast READ at step 434 by driving control signals to the PCI bus, according to known PCI methods, indicating data is ready for transmission. At step 436, target 1 writes data onto the PCI bus, followed by the remaining data from each of the remaining targets at step 438 as they arbitrate for bus access. At step 440, the host receives data off of the PCI bus as it is placed onto the PCI bus. Control then returns back to beginning to wait for a subsequent request from the host.

[0037] According to an alternative embodiment, the group of target controllers can participate in a MIST WRITE operation, as known in the art, back to the original requester. Specifically, as each target controller receives the requested data, it notifies the first target controller in the collective group. That first target controller waits until all the controllers in the collective group have sent notification data has been received. The first target controller initiates a PCI MIST WRITE to a specific address according to known methods. Each target of the collective group recognizes the MIST WRITE command with the address of the specified initiator device and knows it has data for this address. The targets arbitrate for the PCI bus driving the address and data lines when it is time to place data on the bus. The first target controller of the collective controllers then releases the PCI control lines when the transaction is complete and the host has received all of the data. Here again, the efficiencies resulting from both a broadcast READ request allowing multiple target controllers to read smaller segments of data along with the simultaneous execution of the read requests by multiple controllers to interleaved memory results in shorter cycle time thereby improving overall system performance.

[0038] Turning now to Figure 5, shown is an exemplary WRITE operation according to one embodiment of the disclosed subject matter. Specifically, at step 502, an initiator issues a single WRITE command to multiple targets. At step 504, much like during a READ operation, a target group recognizes the base address from the WRITE command. This target group is defined

during the configuration as discussed above with reference to Figure 3. The collective controllers recognize the base address from the WRITE command and start listening and buffering respective data according to the interleaved memory assignment configuration. Each controller then initiates the WRITE request to the peripheral or input/output devices, for example, memory devices such as SCSI disk drives.

[0039] At steps 506, 508 and 510, target 1, target 2, to target N of the collective target group executes the WRITE command by sending data to the assigned portion of memory. Control then returns to step 502 where the system waits idle until another command is issued. Thus, similar to the READ operation, the multicast WRITE broadcast provides for multiple target devices to execute smaller portions of data and allowing these multiple target devices to WRITE the data to memory in a simultaneous fashion according to the interleaved memory assignments set during configuration.

[0040] Thus, a process is achieved whereby increased system efficiency and speed is achieved as multiple target devices or controllers execute portions of a larger READ or WRITE command. Since this is accomplished with a single transaction instead of multiple sequential transactions, the command cycle time is reduced. Improved system speed is achieved by increasing data transfer between the controllers and memory devices thereby presenting data to the host bus, having a much higher throughput capability, more frequently. Furthermore, memory is apportioned among the target devices responsible for responding to the requests to allow the request to be broken into smaller data segments. Thus, an improvement over typical multicast is achieved by allowing each target or controller device of the configured target group to execute different portions of the request independent of and simultaneous with the other targets of the collective group executing the remainder portion of the request. As additional controllers are configured as part of a larger collective controller group, throughput increases without limitation by the throughput of the host bus.

[0041] The foregoing disclosure and description of the various embodiments are illustrative and explanatory thereof, and various changes in the type or memory, descriptions of the microcontroller, the target controllers, the host bridge, the memory devices, and other circuitry, the organization of the components, and the order and timing of steps taken, as well as in the details of the illustrated system may be made without departing from the spirit of the invention.

CLAIMS:

We claim:

1. A method for transacting between an initiator device and a plurality of target devices, the method comprising the steps of:

configuring the plurality of target devices to associate a portion of memory with a particular target device of the plurality of target devices;

sending a multicast transaction from the initiator device to the plurality of target devices;

executing the transaction when the transaction is received by the plurality of target devices according to the configuration of the target device.

2. The method of claim 1, the configuring step further comprising:

assigning a base memory address to be shared by the plurality of target devices; and

assigning a first portion of memory to a first target device of the plurality of target devices.

3. The method of claim 2, wherein the transaction is a read request for a block of stored data from memory, the executing step further comprising:

reading the base memory address from the read request;

initiating a read operation by the plurality of target devices assigned to the base memory address;

fetching stored data from a portion of memory associated with each of the target devices, the data being concurrently fetched by each associated target device; and

sending the fetched data to the initiator device.

4. The method of claim 2, wherein the transaction is a write request for data to be stored in memory, the executing step further comprising:

reading the base memory address from the write request;

initiating a write operation by the plurality of target devices assigned to the base memory address; and

writing data of the write request to a portion of memory associated with each target device, the data being concurrently written by each associated target device.

5. The method of claim 1, wherein the target devices comprise input/output controllers.

6. The method of claim 1, wherein the target devices comprise disk array controllers.

7. The method of claim 1, wherein the plurality of target devices comprise a target group, the target group addressable with a single base memory address.

8. The method of claim 1, further comprising:
a plurality of target groups.

9. A method for transacting data stored in memory between an initiator device and multiple target devices, the method comprising the steps of:
detecting a multicast transaction request;
accessing a first portion of memory by a first target device associated with the first portion of memory in response to the multicast transaction request; and
accessing a second portion of memory by a second target device associated with the second portion of memory concurrently with access to the first portion of memory in response to the multicast transaction request.

10. The method of claim 9, wherein the target devices comprise input/output controllers.

11. The method of claim 9, wherein the target devices comprise disk array controllers.

12. The method of claim 9, wherein the first target device and the second target device are configured as part of a target group, the target group addressable with a single base memory address.

13. The method of claim 12, wherein a plurality of target devices are configured into multiple target groups.

14. The method of claim 9, wherein the multicast transaction is a multicast read request.

15. The method of claim 9, wherein the multicast transaction is a multicast write request.

16. A computer system for communicating between an initiator device and multiple target devices comprising:

a communications bus;

an initiator device coupled to the communications bus for initiating a transaction request; and

a plurality of target devices coupled to the communications for executing the transaction request, the plurality of target devices executing the transaction request by each target device concurrently responding to a portion of the transaction request.

17. The computer system of claim 16, wherein the target devices comprise input/output controllers.

18. The computer system of claim 16, wherein the target devices comprise disk array controllers.

19. The computer system of claim 16, wherein the plurality of target devices are accessed with a single base memory address.

20. The computer system of claim 16, wherein the plurality of target devices comprise a target group.

21. The computer system of claim 20, further comprising:

a plurality of target groups.

22. The method of claim 16, wherein the transaction is a multicast read request.

23. The method of claim 16, wherein the transaction is a multicast write request.

24. The computer system of claim 16, wherein the communications bus comprises a Peripheral Component Interconnect (PCI) bus.

25. A computer system for multicast input/output transactions, comprising:

a processor;

a communications bus coupled to the processor;

an initiator device coupled to the communications bus for issuing a multicast transaction; and

a plurality of target devices coupled to the communications bus for executing the multicast transaction with concurrent interleaved data responses.

26. The computer system of claim 25, wherein the target devices comprise input/output controllers.

27. The computer system of claim 25, wherein the target devices comprise disk array controllers.

28. The computer system of claim 25, wherein the plurality of target devices comprise a target group, the target group addressable with a single base memory address.

29. The computer system of claim 28, further comprising:

a plurality of target groups.

30. The method of claim 25, wherein the multicast transaction is a multicast read request.

31. The method of claim 25, wherein the multicast transaction is a multicast write request.

ABSTRACT

Bus transactions in a computer network are improved by utilizing a multicast transaction from a single initiator to multiple targets. The multiple targets simultaneously execute the transaction and provide a return transaction to the initiator. The transaction cycle time is reduced as individual request to each target is replace with a single request to a collective target group, addressable by a single base memory address. Interleaved read or write operation is provided to allow the multiple targets of a particular target group to independently execute a portion of the transaction request. Improved bus performance is achieve by utilizing the higher throughput capacity of the system bus providing a higher number of shorter data segments from each target executing its portion of the larger transaction.

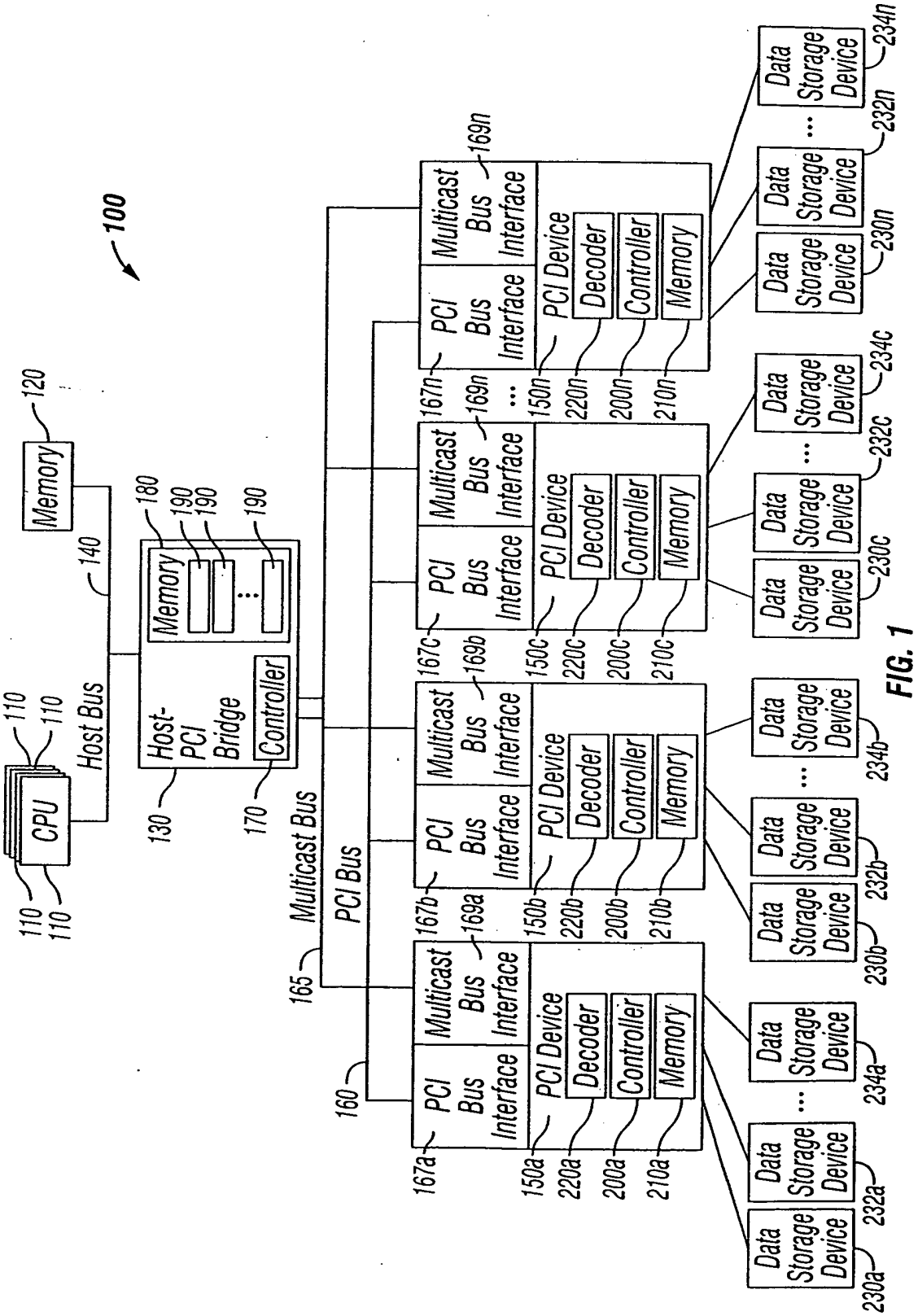

100
CPU
110
Host Bus
140
Memory
120
Host-PCI Bridge
130
Memory
180
190
Controller
170
Multicast Bus
165
PCI Bus
160
PCI Bus Interface
Multicast Bus Interface
PCI Device
Decoder
Controller
Memory
Data Storage Device

FIG. 1

FIG. 2A

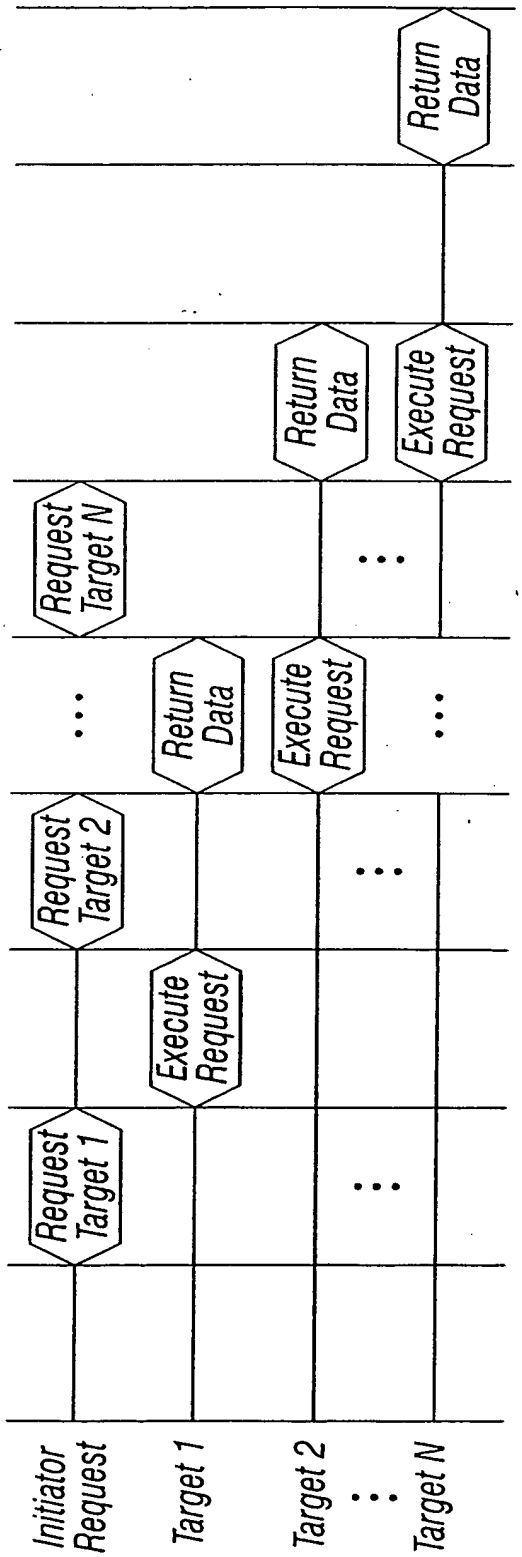
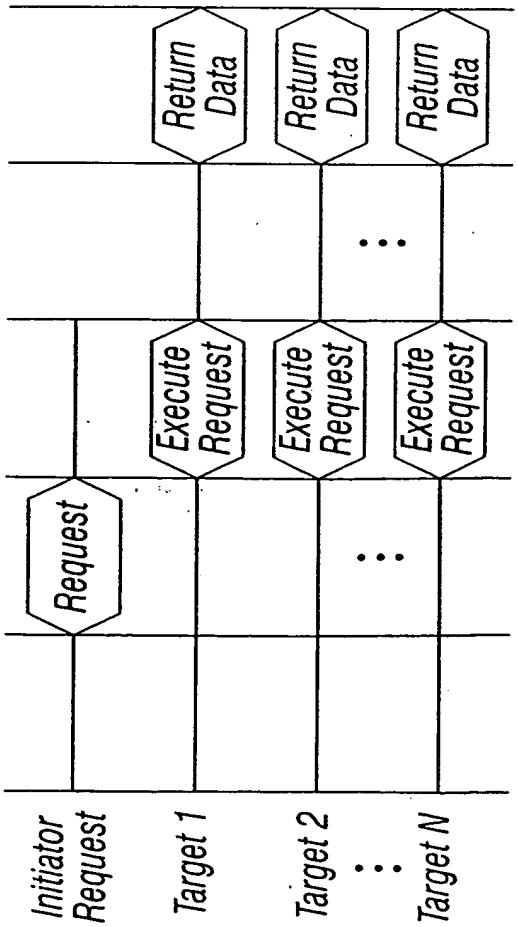

Initiator Request
Target 1
Target 2
Target N
Request Target 1
Execute Request
Request Target 2
Return Data
Execute Request
Request Target N
Return Data
Execute Request
Return Data

FIG. 2B


Initiator Request
Target 1
Target 2
Target N
Request
Execute Request
Execute Request
Execute Request
Return Data
Return Data
Return Data

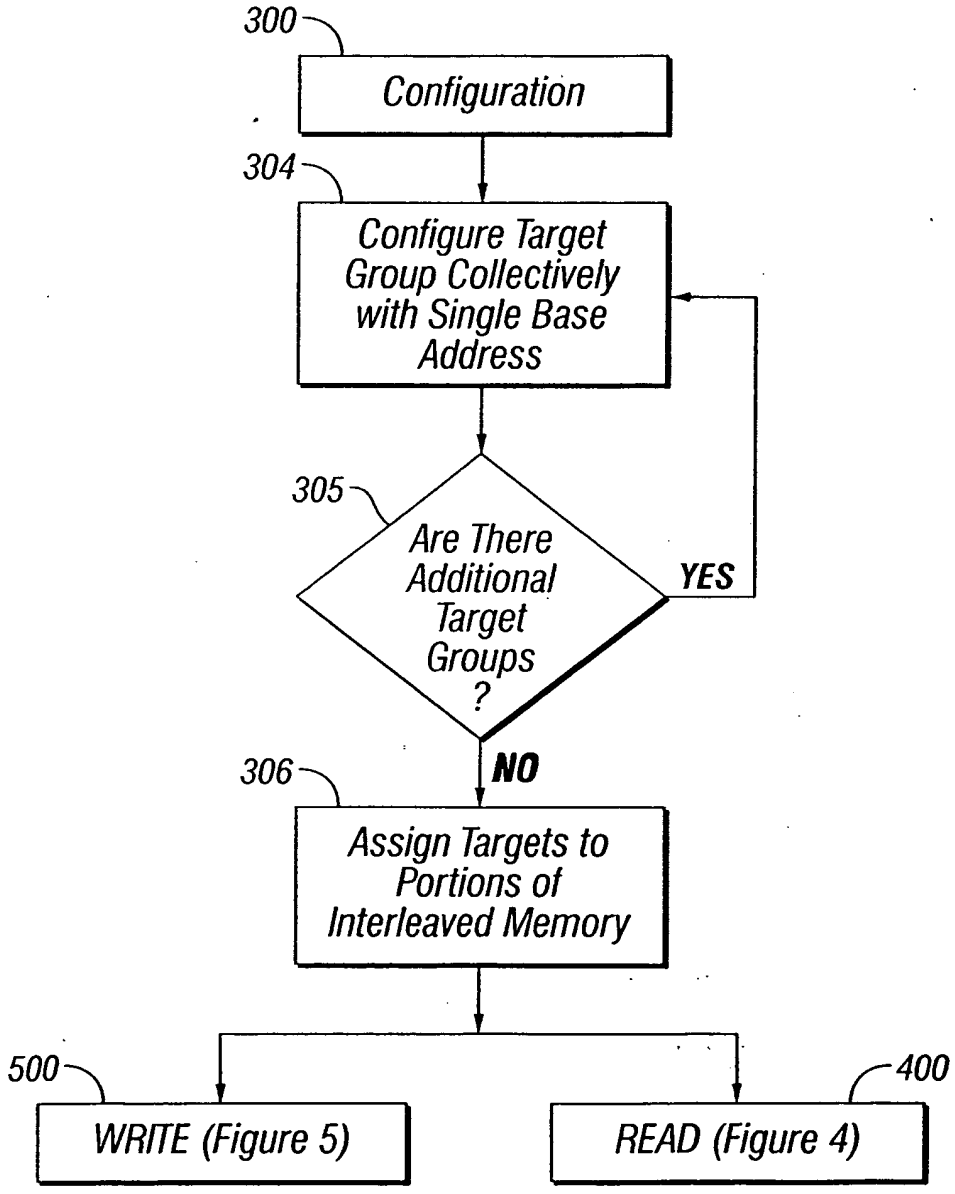

300
Configuration
304
Configure Target Group Collectively with Single Base Address
305
Are There Additional Target Groups ?
YES
NO
306
Assign Targets to Portions of Interleaved Memory
500
WRITE (Figure 5)
400
READ (Figure 4)

FIG. 3A

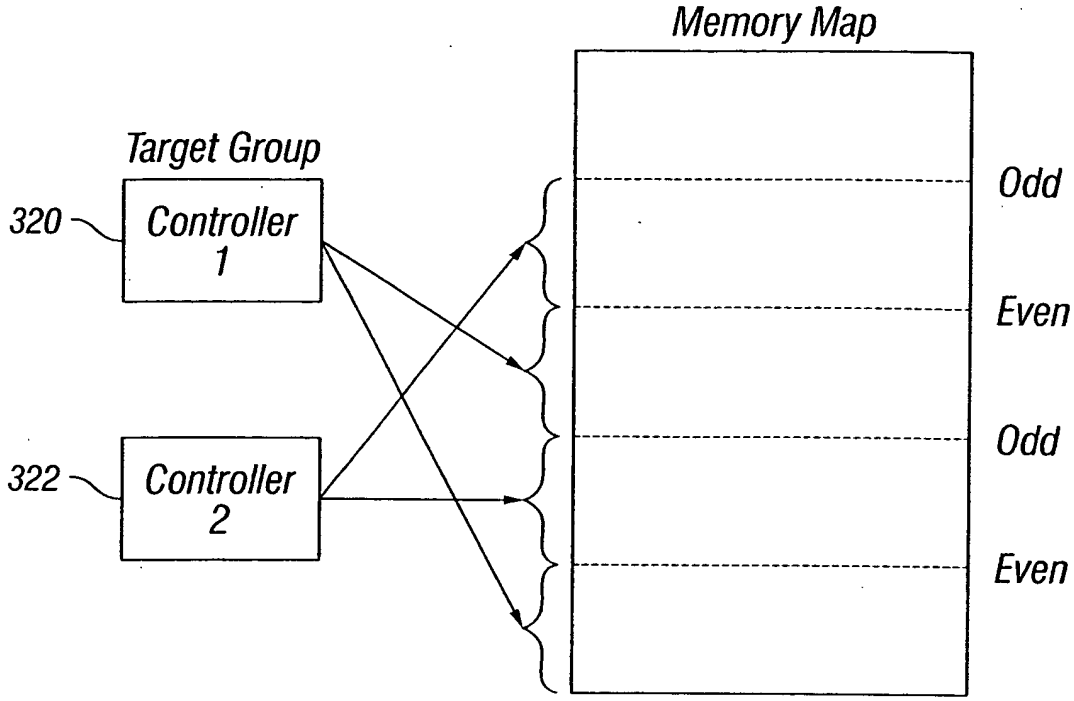

Memory Map
Target Group
320
Controller 1
322
Controller 2
Odd
Even
Odd
Even

FIG. 3B

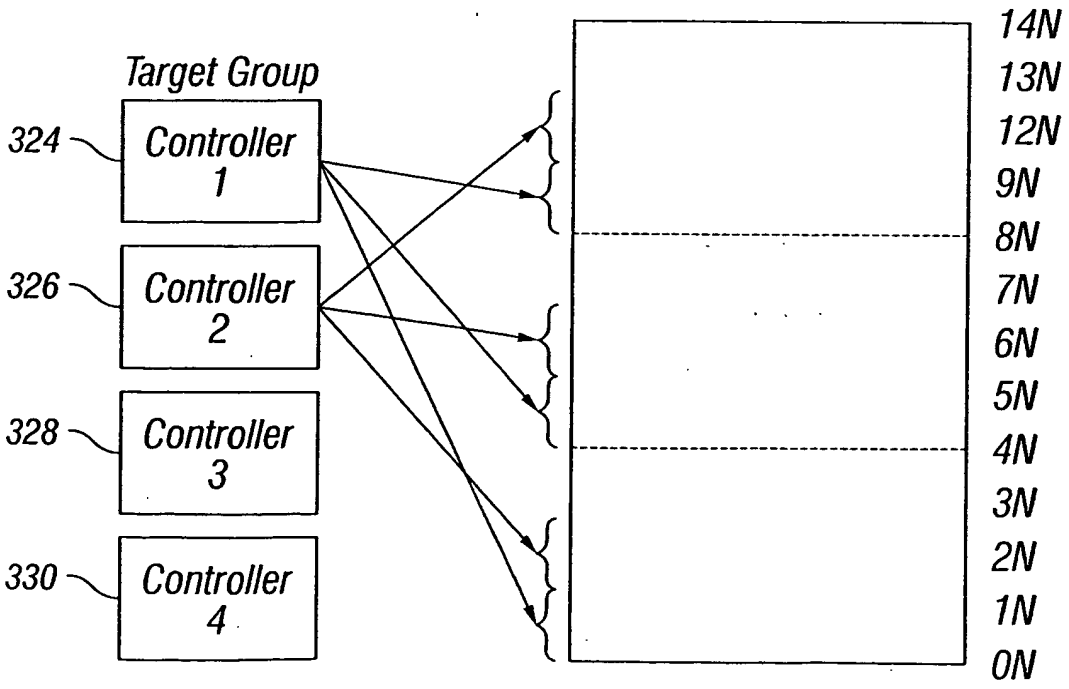

Target Group
324
Controller 1
326
Controller 2
328
Controller 3
330
Controller 4
14N
13N
12N
9N
8N
7N
6N
5N
4N
3N
2N
1N
0N

FIG. 3C

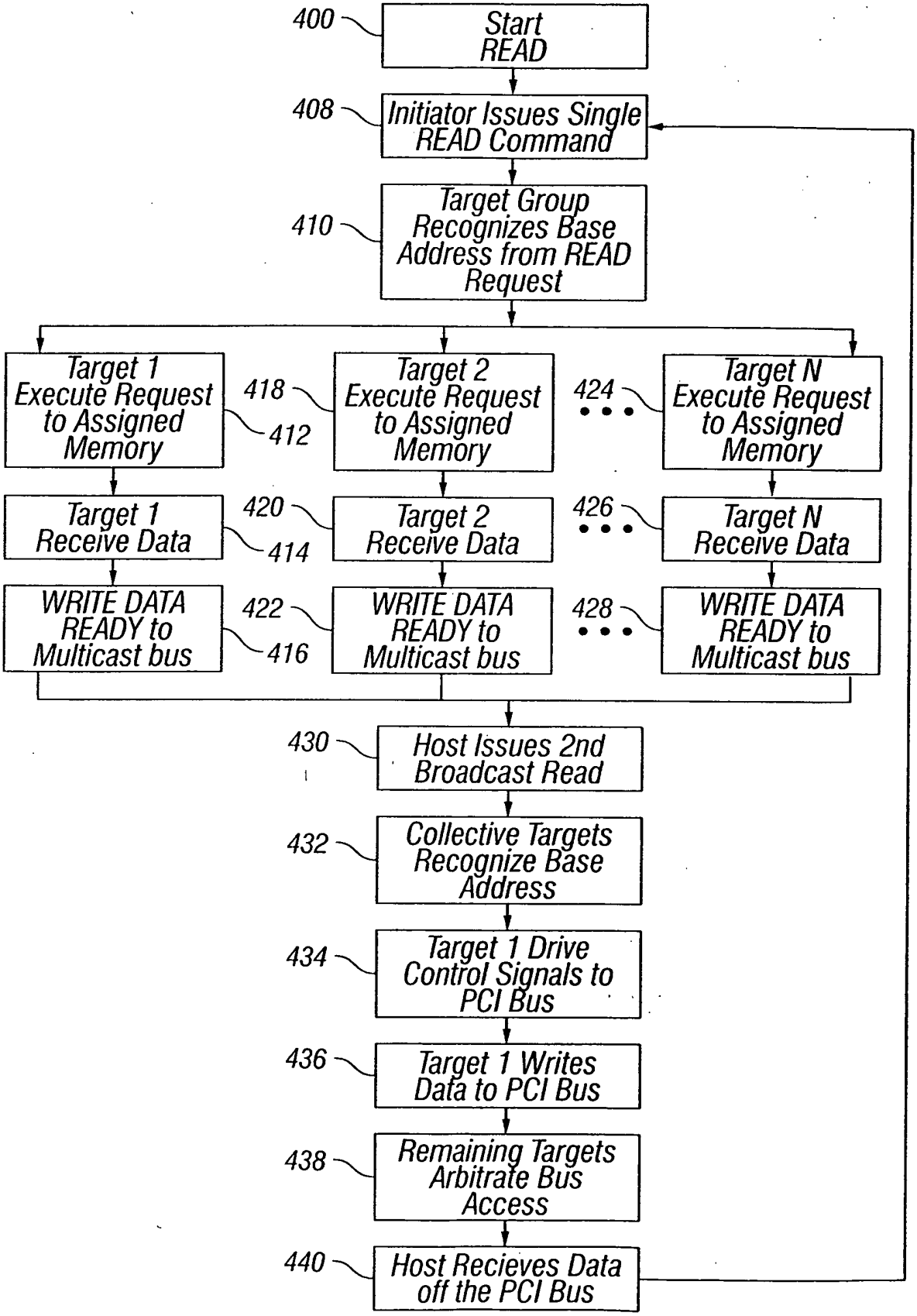

400
Start READ
408
Initiator Issues Single READ Command
410
Target Group Recognizes Base Address from READ Request
Target 1 Execute Request to Assigned Memory
418
412
Target 2 Execute Request to Assigned Memory
424
Target N Execute Request to Assigned Memory
Target 1 Receive Data
420
414
Target 2 Receive Data
426
Target N Receive Data
WRITE DATA READY to Multicast bus
422
416
WRITE DATA READY to Multicast bus
428
WRITE DATA READY to Multicast bus
430
Host Issues 2nd Broadcast Read
432
Collective Targets Recognize Base Address
434
Target 1 Drive Control Signals to PCI Bus
436
Target 1 Writes Data to PCI Bus
438
Remaining Targets Arbitrate Bus Access
440
Host Recieves Data off the PCI Bus

FIG. 4

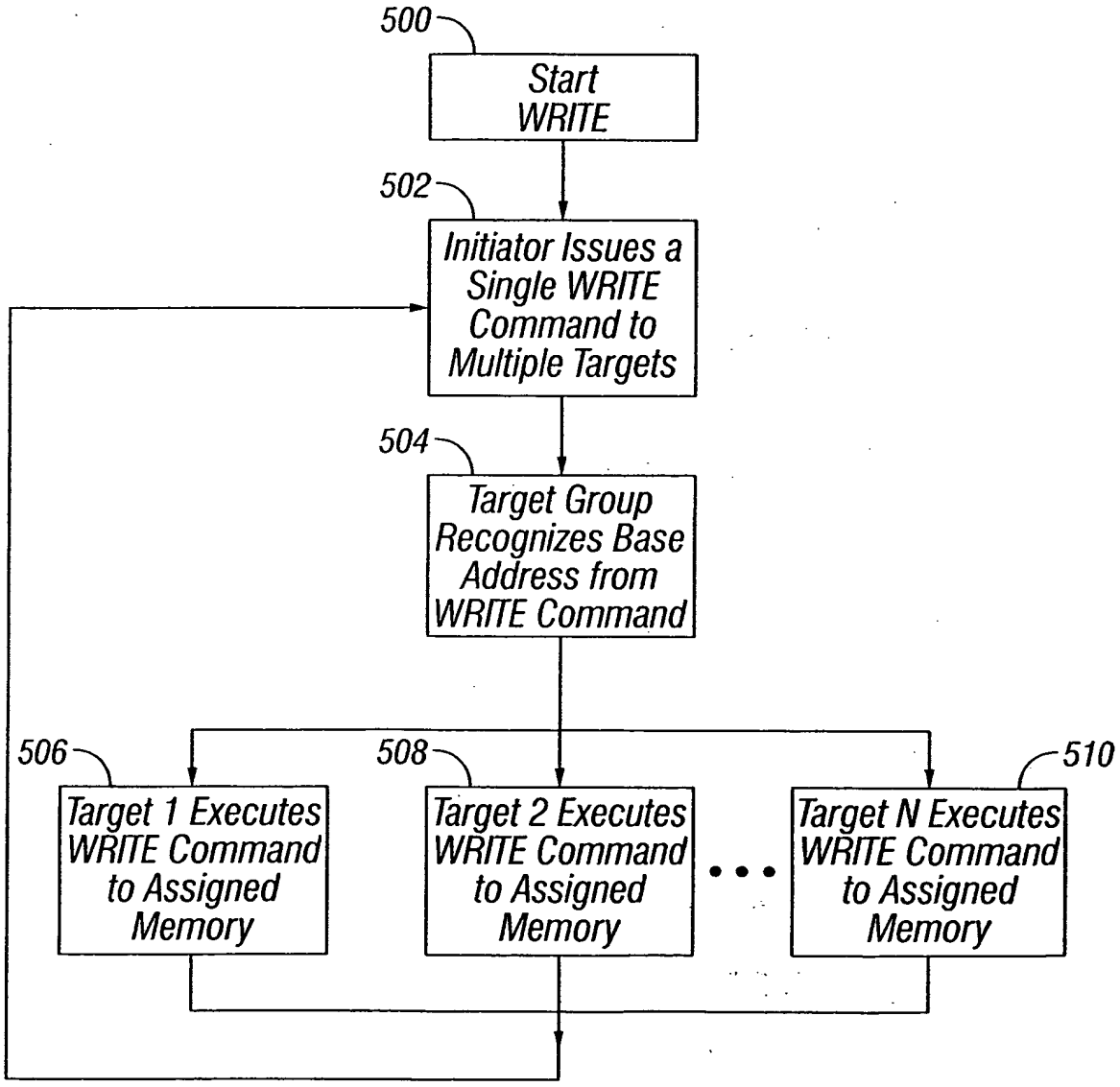
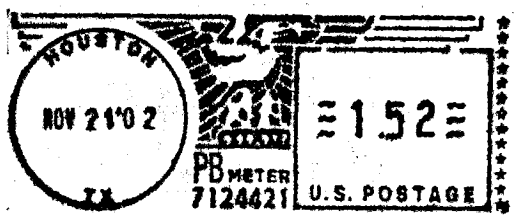

500
Start WRITE
502
Initiator Issues a Single WRITE Command to Multiple Targets
504
Target Group Recognizes Base Address from WRITE Command
506
Target 1 Executes WRITE Command to Assigned Memory
508
Target 2 Executes WRITE Command to Assigned Memory
510
Target N Executes WRITE Command to Assigned Memory

FIG. 5



AKIN GUMP
STRAUSS HAUER & FELD LLP
Attorneys at Law

RMP 052617.1129

NOV 2 6 2002

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17130 Kirkchapel Drive
Spring, Texas 77379

1900 Pennzoil Place / South Tower / 711 Louisiana Street
Houston, TX 77002-2720

COOK130 773792021 1N 28 11/25/02
RETURN TO SENDER

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UNABLE TO FORWARD
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:		§	**Confirmation No.: 7506**
	SOMPONG PAUL OLARIG PAMELA M. COOK	§	
Filed:	December 31, 2001	§	Art Unit: 2166
Serial No.:	10/039,010	§	Examiner:
For:	SUPPORTING INTERLEAVED READ/WRITE OPERATIONS FROM/TO MULTIPLE TARGET DEVICES	§	Docket No.: H052617.1129US0

Attn: Office Of Petitions
Assistant Commissioner for Patents
Washington, D.C. 20231

DECLARATION OF ROCHELLE M. PLEASANT

I, Rochelle M. Pleasant, declare as follows:

1. I am over the age of 18 years of age and am fully competent to make this declaration. I am a prosecution paralegal in the firm of Akin Gump Strauss Hauer & Feld LLP, the designated attorneys of record by Compaq Information Technologies Group, L.P. ("CITG") in the above-identified patent application, as reflected by the Power of Attorney executed by Marcella Barboza, Patent Administrator for CITG, assignee of the interests of co-inventors Sompong Paul Olarig and Pamela M. Cook. Unless otherwise indicated, I have personal knowledge of the facts set forth herein.

2. On information and belief, a Decision Refusing Status Under 1.47(a) in the above-referenced application was mailed to our office on October 25, 2002.

3. On November 21, 2002, I sent a letter via certified mail, return receipt requested, to Pamela M. Cook at her last known home address requesting that she execute a Declaration and an Assignment conveying her interests in the above-identified patent application to Compaq (*see* Exhibit 1 attached to Request for Reconsideration). Also enclosed with the letter was a copy of the above-referenced patent application as filed with formal drawings. The letter was returned

EXHIBIT 3

"No Forward Order on File, Unable to Forward, Return to Sender," as noted by the U.S. Post Office on November 25, 2002 (*see* Exhibit 1 attached to Request for Reconsideration).

BACKGROUND FACTS

4. On April 5, 2002, I attempted to contact Ms. Pamela M. Cook at her last known home telephone number of 281-251-9330, and received a recording stating that the telephone number was disconnected. I then called directory assistance in Houston, Austin, San Antonio, and Dallas areas in an attempt to locate Ms. Pamela M. Cook, to no avail. Further, I performed an Internet search on www.theultimatewhitepages.com (a searchable website using five different search engines), and after contacting some of the Pamela Cook's listed in Texas, was not able to locate the Pamela Cook who used to be employed by CITG, the Assignee in this application (*see* printout attached as **Exhibit A,** search criteria "Pam Cook").

5. On the same date, I emailed Rebecca Evans, Administrative Assistant for CITG in this application, regarding the whereabouts of Pamela M. Cook. A printout from the CITG's database was provided for a "Pamela Cook" in Greenbelt, Maryland (*see* copy of email and printout attached as **Exhibit B**). On April 25, 2002, I contacted the Pamela Cook listed on the attached printout, who informed me that she is not the same Pamela M. Cook and she never lived in Houston, Texas.

6. On July 12, 2002, I emailed CITG in the normal course of business with the July 8, 2002 filing of the Transmittal of Missing Parts, indicating that we were still attempting to locate Pamela M. Cook, co-inventor of this application (*see* email attached as **Exhibit C**).

7. On or about August 1, 2002, the undersigned's office received the Notice of Incomplete Reply (mailed by the PTO on July 25, 2002). Further searches were performed via directory assistance and the Internet in an attempt to locate the co-inventor, Ms. Pamela M. Cook (*see* printouts to attached to listed Exhibits).

8. On November 21, 2002, in addition to sending a letter to Ms. Pamela M. Cook at her last known address via certified mail and regular mail, I performed another directory assistance search throughout Texas (Austin, Dallas, Houston, San Antonio), as well as using several search engines available on the Internet in an attempt to locate Ms. Cook. The same information was listed as earlier searches revealed. On that same date, I telephoned Ms. Susan

Scott, Administrative Assistant for CITG, requesting a date of birth, Social Security number, and/or full legal name (middle name), to assist me in narrowing the search of Ms. Cook nationwide. Per Ms. Scott, no information was available on CITG's database. On the same date, I also attempted to contact Mr. Curt Belusar, the last known supervisor of Ms. Pamela M. Cook at CITG, in an attempt to find additional information for Ms. Cook; however, Mr. Belusar is no longer employed with CITG.

9. On December 18, 2002, I emailed Ms. Rebecca Evans and Susan Scott, Administrative Assistants for CITG, again requesting more information to help us locate Ms. Cook (*see* email printout attached as **Exhibit D**). No additional information was available.

10. On the same date, and without more detailed information for Ms. Cook, I searched www.USSearch.com using the criteria: First Name: Pamela, Middle Initial: M., Last Name: Cook, State: Texas, and Approximate Age: 38. This produced a listing of 21 records in the State of Texas (*see* attached printout as **Exhibit E**). However, without more information, including the approximate age of Ms. Cook, and after previous voicemail messages for the Pamela M. Cook's located in Texas were not returned, the undersigned believes it has satisfied the requirements of 37 C.F.R. 1.47(a)(1) with proof that the non-signing inventor cannot be reached or located.

11. In an effort to avoid having to file this Request for Reconsideration today, I performed a nationwide search using the criteria: "Pamela Cook." On www.USSearch.com, there were too many possible matches to list, without ordering one of their services. On www.phone.whowhere.com, the search reveals over 105 listings for "Pamela M. Cook" nationwide. To this date, co-inventor Ms. Pamela M. Cook cannot be located and her whereabouts through CITG is still unknown. The undersigned's office believes it has met the requirements under 37 CFR 1.47(a) by making a diligent effort to search and attempt to locate Ms. Cook.

EXHIBIT 3

12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 12.16.2002

Rochelle M. Pleasant, Prosecution Paralegal
Akin Gump Strauss Hauer & Feld LLP

EXHIBIT 3

Search Information:
Searched terms: "Cook, Pam, tx"
Search took 0.27 seconds

New search | Modify search
1 Total Results

Cook, Pam
7825 Indian Blanket
Beaumont, TX 77713
409-860-0110

Search public records
Find all info on Pam Cook

» 1/1
More Info for Pam Cook
Map this location

Listings

Searching for: Pam Cook TX US

First names that start with

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ALL

Results 1 - 5 of 10 previous | next

Cook, Pam
7825 Indian Blanket
Beaumont, TX 77713
Map | Nearby Businesses | + Address Book
Search Public Records for Pam Cook
Find Pam Cook at Classmates.com!
409-860-0110
update/remove

Cook, Pamela
1103 Parker Ct
Cedar Hill, TX 75104
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela Cook at Classmates.com!
972-293-6014
update/remove

Cook, Pamela
14106 Palo Seco Dr
Corpus Christi, TX 78418
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela Cook at Classmates.com!
361-949-6713
update/remove

Cook, Pamela
7746 Westbank Ave
Houston, TX 77064
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela Cook at Classmates.com!
713-849-9428
update/remove

Cook, Pamela
263 Fm 247 Rd
936-291-8251
update/remove

Huntsville, TX 77320
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela Cook at Classmates.com!

Results 1 - 5 of 10 previous | next

Jump to page # [ ] Go

data by ACXIOM

*** Asterisks designate user enhanced listings.**

Search Again

Last [Cook] (required)

First or Initial [Pam]

City [ ]

State [Texas]

[Find]

White Pages Partners

Search the Public Information Portal on US SEARCH
Find Old Friends at Classmates.com!
PEOPLE SEARCH get search results or its free
Search Criminal Records for $25/year

White Pages Search: Quick | Find a Business | Reverse Lookup
International Search: Canada | United Kingdom | World Directories
Other: City Guide | Yellow Pages | Maps | Directions | Add Your Listing

Helpful Tools

Help

Reverse Lookup - Have a phone number but don't know whom it belongs to? Use Reverse Lookup to find out more information about phone numbers, area codes, a specific address or an email address. Available for Canada too!
World Directory - Want to search a country not listed above? Use our World Directory list to find it.
Near Address - Wondering what businesses are closest to your home or office? Near Address helps you find businesses closest to a specific address or from a city center point.

Can't Find Them in the White Pages?

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Listings

Searching for: Pam Cook TX US

First names that start with
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ALL

Results 6 - 10 of 10 previous | next

Cook, Pamela — **972-966-3536**
241 Raintree Dr
Lewisville, TX 75077
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela Cook at Classmates.com!
update/remove

Cook, Pamela — **512-353-3447**
126 Quail Creek Dr
San Marcos, TX 78666
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela Cook at Classmates.com!
update/remove

Cook, Pamela A P — **713-572-8122**
1776 Yorktown St
Houston, TX 77056
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela A P Cook at Classmates.com!
update/remove

Cook, Pamela A P — **713-704-0800**
6655 Travis St
Houston, TX 77030
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela A P Cook at Classmates.com!
update/remove

Cook, Pamela E — **713-522-9283**
3730 Kirby Dr
update/remove

Houston, TX 77098
Map | Nearby Businesses | + Address Book
Search Public Records for Pamela Cook
Find Pamela E Cook at Classmates.com!

Results 6 - 10 of 10 previous | next

Jump to page # Go

data by ACXIOM

*** Asterisks designate user enhanced listings.**

Promotions
- **PEOPLE SEARCH get search results or its free**
- **Criminal Records - $25/year**
- **Search for public records on US SEARCH.com**
- **Find Old Friends at Classmates.com!**

Search Again

Last Cook (required)

First or Initial Pam

City

State Texas

Find

White Pages Partners

Search the Public Information Portal on US SEARCH
Find Old Friends at Classmates.com!
PEOPLE SEARCH get search results or its free
Search Criminal Records for $25/year

White Pages Search: Quick | Find a Business | Reverse Lookup
International Search: Canada | United Kingdom | World Directories
Other: City Guide | Yellow Pages | Maps | Directions | Add Your Listing

Helpful Tools

Help

Reverse Lookup - Have a phone number but don't know whom it belongs to? Use Reverse Lookup to find out more information about phone numbers, area codes, a specific address or an email address. Available for Canada too!
World Directory - Want to search a country not listed above? Use our World Directory list to find it.
Near Address - Wondering what businesses are closest to your home or office? Near Address helps you find businesses closest to a specific address or from a city center point.

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People Finder Wizard! I'm looking for a Lost Friend , in the State of .
The name is: First Last Start Search
Click Here, or Call 1-800-US-SEARCH

Welcome, rpleasant2001

Edit/Create My Listing - Sign

Phone Search Results

Search Again powered US Se
People Locate Background Check

Showing 1 - 4 of 4

First | Previous | Next | Last Search A

Name (click for details)	Address	Phone (click to call)	
Mike Pam Cook	345 Holly Ln Allen , TX	(972) 442-6922	Want more information? Get a "US Search"
Pam Cook	7825 Indian Blanket Beaumont , TX	(409) 860-0110	Want more information? Get a "US Search"
Pam Cook	1296 Trent St Goldthwaite , TX	(915) 648-6177	Want more information? Get a "US Search"
Pam Cook	Hitchcock , TX	(409) 978-2294	Want more information? Get a "US Search"

First | Previous | Next | Last Search A

Who ?

Find: A Phone Number for
Name: First Last Search

Limit results to:

City:

All Cities

State:

All States

Add Your Email Address

Phone & Address Search Results

Matches appear in alphabetical order by State, Area Code and City.
Can't find them on WhoWhere? Search Public Records

Pam Cook
Phone: 409-860-0110
7825 Indian Blanket,
Beaumont, TX 77713-8564
Search Public Records for Pam Cook
Locate all info available for Pam Cook

Pam Cook
Phone: 409-978-2294
Hitchcock, TX 77563
Search Public Records for Pam Cook
Locate all info available for Pam Cook

Pam S Cook
Phone: 915-648-6177
1296 Trent St,
Goldthwaite, TX 76844-0000
Search Public Records for Pam S Cook
Locate all info available for Pam S Cook

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Search 1000s of Public Databases with one click! Find Addresses, Property Licenses, Court Records and much, more more...

First Name: Last Name:
Street: City:
State: Zip:

Search

AnyWho

Tip - When searching for a person enter the first four letters of the last name, first initial and location.

Find a Person

Last Name (e.g., Bush) *Required*: Cook

First Name (e.g., Georg: Pam

Street Name (e.g., Pennsylvania):

City: and

State *Required*: Select a State

Zip Code:

Your search is based on: Pam Cook in tx
Results 1 - 10 of 28 Try Public Records!

◀ PRE

Residential Listings

Cook, Dave & Pamela
14106 Palo Seco Dr
CORPUS CHRISTI, TX 78418 361-949-6713
Maps & Directions | Did you go to school with Dave & Pamela Cook?

Cook, David & Pamela
241 Raintree Dr
LEWISVILLE, TX 75077 972-966-3536
Maps & Directions | Did you go to school with David & Pamela Cook?

Cook, Jeffrey A & Pamela
1410 W 39 1/2 St
AUSTIN, TX 78756 512-459-1410
Maps & Directions | Did you go to school with Jeffrey A & Pamela Cook?

Cook, Pam
7825 Indian Blanket
BEAUMONT, TX 77713 409-860-0110
Maps & Directions | Did you go to school with Pam Cook?

Cook, Pamela
1103 Parker Court
CEDAR HILL, TX 75104 972-293-6014
Maps & Directions | Did you go to school with Pamela Cook?

Cook, Pamela
CORSICANA, TX 75110 903-872-0459
Maps & Directions | Did you go to school with Pamela Cook?

Cook, Pamela
7746 Westbank Ave

HOUSTON, TX 77064 713-849-9428
Maps & Directions | Did you go to school with Pamela Cook?

Cook, Pamela
263 Fm 247 Rd
HUNTSVILLE, TX 77320 936-291-8251
Maps & Directions | Did you go to school with Pamela Cook?

Cook, Pamela
126 Quail Creek Dr
SAN MARCOS, TX 78666 512-353-3447
Maps & Directions | Did you go to school with Pamela Cook?

Cook, Pamela & Dave
14106 Palo Seco Dr
CORPUS CHRISTI, TX 78418 361-949-6713
Maps & Directions | Did you go to school with Pamela & Dave Cook?

◀ PRE

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Tip - When searching for a person enter the first four letters of the last name, first initial and location.

Promotions

Good to Great
Jim Collins
New $15.85!

(Prices May Change)
Privacy Information

Find a Person

Last Name (e.g., Bush) *Required*
Cook

First Name (e.g., Georg
Pam

Street Name (e.g., Pennsylvania)

City
and

State *Required*
Select a State

Zip Code

F

Your search is based on: Pam Cook in tx
Results 11 - 20 of 28 Try Public Records!

PRE

Residential Listings

Cook, Pamela & David
241 Raintree Dr
LEWISVILLE, TX 75077 972-966-3536
Maps & Directions | Did you go to school with Pamela & David Cook?

Cook Pamela E
3730 Kirby Dr
HOUSTON, TX 77098 713-522-9283
Maps & Directions | Did you go to school with Cook Pamela E?

Cook, Pamela & Jeffrey A
1410 W 39 1/2 St
AUSTIN, TX 78756 512-459-1410
Maps & Directions | Did you go to school with Pamela & Jeffrey A Cook?

Cook, Pamela K
4705 Green Bluff Dr
SCHERTZ, TX 78154 210-946-6542
Maps & Directions | Did you go to school with Pamela K Cook?

Cook, Pamela & Stephen
10610 Dunlap St
HOUSTON, TX 77096 713-721-7773
Maps & Directions | Did you go to school with Pamela & Stephen Cook?

Cook, Stephen & Pamela
10610 Dunlap St
HOUSTON, TX 77096 713-721-7773
Maps & Directions | Did you go to school with Stephen & Pamela Cook?

Cooke, Claude & Pamela
519 Purdy St
BROOKSHIRE, TX 77423 281-375-5310
Maps & Directions | Did you go to school with Claude & Pamela Cooke?

Cooke, Jay & Pam
6706 Prosper Dr
AMARILLO, TX 79119 806-356-9027
Maps & Directions | Did you go to school with Jay & Pam Cooke?

Cooke, Pam
6221 Cedar Hollow Dr
AMARILLO, TX 79124 806-355-5449
Maps & Directions | Did you go to school with Pam Cooke?

Cooke, Pam F
1607 Live Oak St
GOLDTHWAITE, TX 76844 915-648-3962
Maps & Directions | Did you go to school with Pam F Cooke?

PRE

Search Results - 75 Records Found

Option 1 - Click on the name to get the **current or historical address**. (From $9.95 - Internet Only)
Option 2 - Basic address information for all records: Click here. ($14.95 - Internet Only) Sample Report

#	Name	City	State	Age
1	PAM COOK	PEKIN	IL	47
2	PAM COOK	HUDSON	NY	-
3	PAM COOK	SYRACUSE	NY	45
4	PAM COOK	MANSFIELD	OH	43
5	PAM COOK	HAMILTON	OH	43
6	PAM COOK	SARDINIA	OH	43
7	PAM COOK	BUCYRUS	OH	43
8	PAM COOK	MIDDLETOWN	OH	43
9	PAM COOK	STEUBENVILLE	OH	41
10	PAM D COOK	COLUMBUS	OH	43
11	PAM F COOK	ENON	OH	-
12	PAM COOK	GRAND HAVEN	MI	-
13	PAM COOK	JACKSONVILLE	FL	-
14	PAM COOK	LAKELAND	FL	-
15	PAM COOK	MARIETTA	GA	-

16	PAM COOK	FAIRBURN	GA	-
17	PAM COOK	MILAN	GA	47
18	PAM COOK	NEWNAN	GA	45
19	PAM L COOK	NAHUNTA	GA	44
20	PAM BROOKS COOK	BRANTLEY	AL	33
21	PAM BROOKS COOK	BRANTLEY	AL	33
22	PAM COOK	OLD BRIDGE	NJ	47
23	PAM DENISE COOK	HENDERSON	NV	45
24	PAM COOK	WARREN	AR	-
25	PAM A COOK	WHITE HALL	AR	54
26	PAM F COOK	CHARLOTTE	NC	53
27	PAM G COOK	BOONE	NC	36
28	PAM COOK	SANFORD	NC	-
29	PAM COOK	RALEIGH	NC	-
30	PAM COOK	BLOWING ROCK	NC	-
31	PAM COOK	MILWAUKEE	WI	-
32	PAM COOK	HALES CORNERS	WI	47
33	PAM A COOK	BROOKLYN	WI	39
34	PAM A COOK	OREGON	WI	39
35	PAM L COOK	CLINTON	IA	40
36	PAM COOK	JOHNSTOWN	PA	-
37	PAM COOK	WILLOW SPRINGS	MO	-
38	PAM COOK	BLUE SPRINGS	MO	29
39	PAM COOK	SPEARFISH	SD	-
40	PAM COOK	BOWLING GREEN	KY	56
41	PAM COOK	MAYFIELD	KY	54
42	PAM COOK	BEDFORD	TX	58
43	PAM COOK	JACKSBORO	TX	51
44	PAM SEAY COOK	LUBBOCK	TX	45
45	PAM COOK	BEND	OR	-
46	PAM COOK	NOTI	OR	-

47	PAM L COOK	MUSTANG	OK	45
48	PAM S COOK	BARTLESVILLE	OK	46
49	PAM S COOK	DENVER	CO	42
50	PAM COOK	BIG SANDY	TN	-
51	PAM BISHOP COOK	OKOLONA	MS	-
52	PAM COOK	COVINGTON	LA	49
53	PAM COOK	QUITMAN	LA	-
54	PAM COOK	CLINTON	LA	-
55	PAM A COOK	TRENTON	SC	48
56	PAM COOK	CHULA VISTA	CA	-
57	PAM COOK	MANTECA	CA	-
58	PAM COOK	MODESTO	CA	-
59	PAM COOK	REDONDO BEACH	CA	-
60	PAM COOK	BAKERSFIELD	CA	83
61	PAM COOK	CHULA VISTA	CA	43
62	PAM DEE COOK	MONTROSE	CA	49
63	PAM J COOK	JAMUL	CA	41
64	PAM L COOK	MANHATTAN BEACH	CA	38
65	PAM P COOK	LODI	CA	41
66	PAM R COOK	SAN BERNARDINO	CA	49
67	PAM R COOK	SAN BERNARDINO	CA	49
68	PAM R COOK	SUGARLOAF	CA	49
69	PAM K COOK	BOISE	ID	-
70	PAM COOK	MIDVALE	UT	-
71	PAM T COOK	OREM	UT	34
72	PAM COOK	BALTIMORE	MD	-
73	PAM COOK	CHARLESTON	WV	-
74	PAM COOK	BECKLEY	WV	-
75	PAM COOK	ARLINGTON	VA	-

Pleasant, Rochelle

From: Pleasant, Rochelle
Sent: Friday, April 05, 2002 11:50 AM
To: 'CQ - Becky Evans'
Cc: Clonts, David R; Jordan, George W; Schafer, Richard
Subject: P98-2406 Power of Attorney (Our Ref: 052617.1129)
Importance: High

Attached is the Power of Attorney for the referenced application. I emailed the formal papers to Paul Olarig for his execution. I will fax the signed declaration once I receive it.

I understand that Pamela M. Cook (2nd named inventor) is no longer with Compaq and directory assistance nor the residence listings have a listing for her here in Houston. I will try an Internet search for her and if unsuccessful, we will have to file a petition under 37 CFR 1.183 to waive Ms. Cook's signature requirement.

Due to PTO: April 8, 2002

Rochelle M. Pleasant, CLA
Prosecution Paralegal
Intellectual Property Section
Akin, Gump, Strauss, Hauer & Feld, LLP
711 Louisiana, 19th Floor -South Tower
Houston, Texas 77002
(713) 250-2133 - direct
(713) 220-2304 - direct fax

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:	§	Confirmation No.:	7506
SOMPONG PAUL OLARIG PAMELA M. COOK	§		
Filed: December 31, 2001	§	Art Unit:	2166
Serial No.: 10/039,010	§	Examiner:	
For: SUPPORTING INTERLEAVED READ/WRITE OPERATIONS FROM/TO MULTIPLE TARGET DEVICES	§	Docket No.:	H052617.1129US0

POWER OF ATTORNEY BY ASSIGNEE

Under the provisions of 37 C.F.R. § 3.71, the undersigned assignee of record of the entire interest in the above-identified patent/patent application by virtue of an assignment recorded (check as applicable):

- ■ Concurrently Herewith
- ☐ Date Recorded: _____
- ☐ Reel _____ Frame _____

elects to conduct the prosecution of the application/maintenance of the patent to the exclusion of the inventor(s). The undersigned hereby declares that she has reviewed the above-referenced assignment and hereby declares that, to the best of her knowledge, title is in the Assignee, and further declares that all statements made herein of her own knowledge are true and that all statements made on information and belief are believed to be true. The assignee hereby revokes any previous powers of attorney and appoints the following to prosecute this application/maintain this patent and transact all business in the Patent and Trademark Office connected therewith:

Lester L. Hewitt	25,685	Dwayne L. Mason	38,959
David R. Clonts	36,768	Irene Kosturakis	33,724
Richard D. Fladung	30,834	Joseph Arrambide	39,589
Douglas W. Rommelmann	34,418	Sarah T. Harris	35,891
George W. Jordan III	41,880	Richard P. Lange	27,296
John A. Tang	43,404	Theodore S. Park	26,971
Mason A. Gross	40,006	Diane C. Drozenski	39,177
Richard A. Schafer	45,078	Laura Turley	35,850

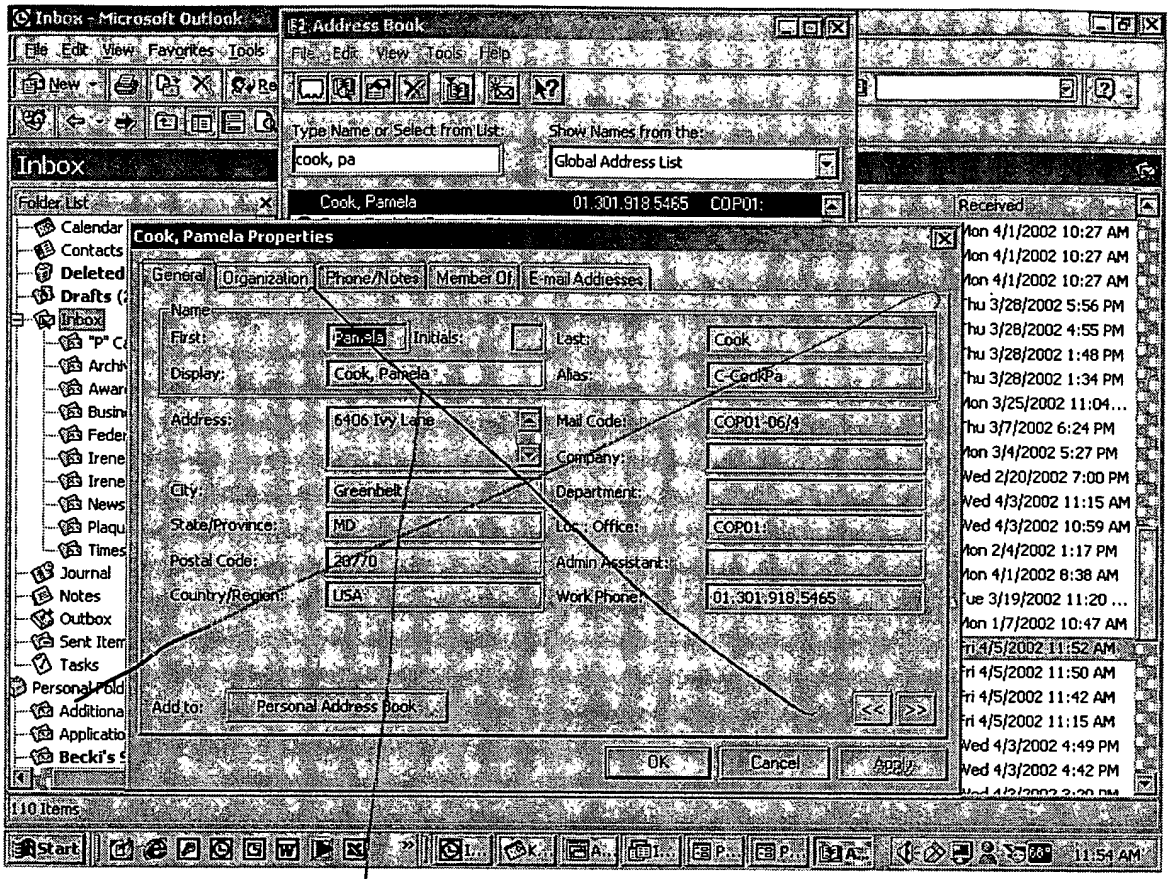
Please direct all communications to: **AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.**, 711 Louisiana, Suite 1900, Houston, Texas 77002, (713) 228-5800.

ASSIGNEE
COMPAQ INFORMATION TECHNOLOGIES GROUP, L.P.

Date: _____ By: _____

Marcella Barboza,
Patent Administrator

Authorized To Sign This Document On Behalf Of
Compaq Information Technologies Group, L.P.
Pursuant To Board Of Directors Resolution of
Compaq Holdings, Inc., as General Partner
Date: September 24, 2001



not same

Pamela Cook

TC Pam Cook

4/25
3:00pm

Pleasant, Rochelle

From: Pleasant, Rochelle
Sent: Friday, July 12, 2002 2:50 PM
To: 'Patent.Pros@hp.com'
Cc: Clonts, David R; Jordan, George W; Schafer, Richard
Subject: P98-2406 Transmittal of Missing Parts w/Assignment

Importance: High

Re: U.S. Patent Application Serial No. 10/039,010
Entitled: Supporting Interleaved Read/Write Operations From/To Multiple Target Devices
Inventors: Sompong P. Olarig and Pamela M. Cook
Our ref: 052617.1129
Compaq No.: P98-2406 (ISSG-SPD)
Applicant: Compaq - Houston

We have made several attempts to reach co-inventor Pamela M. Cook. I spoke with Pamela M. Cook that works for Compaq at another location, however, she was not the correct person. We are going to prepare a Petition to support our efforts to contact Ms. Cook to accept the signature of Paul Olarig on her behalf.


1129 Trans MP.pdf (374 KB)


1129 3 mo ext of time.pdf (208...


1129 filed ssignmt.pdf (303 K.

$400 +
$130

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Home → White Pages → Search Results

help

P. M. Cook in TX

3 people found (1-3 shown)

Modify Search | New Search | Try Public Records!

Cook, P M
1407 Navaho Trl,
Richardson, TX 75080-3734
(972)690-6584

Email, Maps and What's Nearby[SM]
Update this listing
Is this an old classmate?
Find Old Friends & Lost Loves

Send Roses | FREE Credit Report | Low Fares | Find A Date

Cook, P M
6108 York River Dr,
Arlington, TX 76018-2393
(817)557-3341

Email, Maps and What's Nearby[SM]
Update this listing
Is this an old classmate?
Find Old Friends & Lost Loves

Send Roses | FREE Credit Report | Low Fares | Find A Date

Cook, P Mark
1058 N Clinton St,
Stephenville, TX 76401-2904
(254)968-5230

Email, Maps and What's Nearby[SM]
Update this listing
Is this an old classmate?
Find Old Friends & Lost Loves

Send Roses | FREE Credit Report | Low Fares | Find A Date

Modify Search | New Search

* Denotes a Switchboard User

Can't find them? Try These alternatives:
Find Your Old Classmates
Find Singles in Your Area at match.com
Public Records Search - from $9.95

Pleasant, Rochelle

From: Pleasant, Rochelle
Sent: Wednesday, December 18, 2002 5:01 PM
To: 'Evans, Rebecca'
Cc: SCOTT,SUSAN (HP-Houston)
Subject: P98-2406 - Inventor Pamela M. Cook
Importance: High

I am still unable to locate Pamela M. Cook. By chance, do you have any other information, such as a date of birth or full middle name? The last address we have is 17130 Kirkchapel Drive, Spring, TX 77379. There is a Pam Cook who works for HP in Greenbelt, MD, but she is not the same person. The Patent Office wants a more thorough search performed before granting our Petition to accept Paul Olarig's signature on behalf of Pam Cook. Thanks.

Rochelle M. Pleasant, CLA
Patent Prosecution Paralegal
Intellectual Property Section
Akin, Gump, Strauss, Hauer & Feld, LLP
Houston, Texas
(713) 250-2133 - direct
(713) 220-2304 - direct fax
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Begin your Search - Enter the last known information on the person you are searching for:

First Name	Middle Initial	Last Name(req)	Search Type
Pamela	M	Cook	(•) People Locate ( ) Background Search
City	**State**	**Approx. Age (req)**	
	Texas	38	Search

Select the person you are searching for:

E-Mail Results to a Friend

Search Results - 21 Records Found

Option 1 - Click on the name to get the **current or historical address**. (From $9.95 - Internet Only)

Option 2 - Basic address information for all records: Click here. ($14.95 - Internet Only) Sample Report

#	Name	City	State	Age
1	PAMELA M COOK	HUMBLE	TX	60
2	PAMELA MIGNON COOK	PITTSBURG	TX	56
3	PAMELA MCENTIRE COOK	CORPUS CHRISTI	TX	51
4	PAMELA MCENTIRE COOK	MAXWELL	TX	51
5	PAMELA MATTSON COOK	AUSTIN	TX	50
6	PAMELA MARIE COOK	AZLE	TX	46
7	PAMELA MUSLOVSKI COOK	AZLE	TX	46
8	PAMELA MILAM COOK	CROWLEY	TX	45
9	PAMELA MILAM COOK	JOSHUA	TX	45
10	PAMELA M COOK	CROWLEY	TX	45
11	PAMELA MORGAN COOK	CROWLEY	TX	45
12	PAMELA MORGAN COOK	BEAUMONT	TX	45
13	PAMELA M COOK	HOUSTON	TX	42
14	PAMELA M COOK	SPRING	TX	41
15	PAMELA MORSE COOK	SAN ANTONIO	TX	38

16	PAMELA MASSEY COOK	WICHITA FALLS	TX	38
17	PAMELA MASSEY COOK	EL PASO	TX	38
18	PAMELA M COOK	PASADENA	TX	34
19	PAMELA MICHELLE COOK	CONROE	TX	26
20	PAMELA MICHELLE COOK	HUNTSVILLE	TX	26
21	PAMELA MICHELLE COOK	CONROE	TX	26

Option 1 - Click on the name to get the **current or historical address**. (From $9.95 - Internet Only)
Option 2 - Basic address information for all records: Click here. ($14.95 - Internet Only) Sample Report

Need Help?
Having trouble selecting the right record? Let a US SEARCH specialist run your search.

Let a US SEARCH expert run my search